

Al which has been consumed by electric discharge, reacts with C (carbon) which is a component of the processing solution, so that TiC (titanium carbide) can be created. Also, the following knowledge has been gained. When a pressed powder electrode, which is an electrode for electric discharge surface treatment made of metal hydride such as  $\text{TiH}_2$  (hydrogenated titanium), is used and an electric discharge is generated between the pressed powder electrode and the metal of a workpiece, it possible to form a hard coat more quickly, the adhering property of which is higher than that of a case in which Ti is used. Further, the inventors have learned that when a pressed powder electrode, which is an electrode for electric discharge surface treatment in which a hydrogenated compound such as  $\text{TiH}_2$  is mixed with other metal or ceramics, is used and an electric discharge is generated between the pressed powder electrode and the metal of a workpiece, it is possible to quickly form a hard coat of various hardness and abrasion resistance

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**IN THE CLAIMS:**

**Please enter the following amended claims:**

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A2 1. (Amended) An electric power unit for electric discharge surface treatment by which electric discharge is generated between an electrode for electric discharge surface treatment and a workpiece so that a hard coat is formed on a surface of the workpiece, energy of electric discharge, comprising:

a control means for dividing an electric discharge current pulse into a first pulse width with a first peak value, a second pulse width with a second peak value, . . . , and an n-th pulse width with an n-th peak value (n is an integer equal to 2 or more),

A<sup>2</sup> wherein the control means sets the first pulse width and the first peak value so that an electric current density between the electrodes can be in a predetermined range to suppress emission of electrode material, and so that during a period of the first pulse width a diameter of an electric discharge arc column is extended, and

the control means sets the k-th pulse width and the k-th peak value ( $2 \leq k \leq n$ , k is an integer) so that a quantity of supply of hard coat material by the emission of electrode material can be a predetermined value determined according to a predetermined processing condition.

2. (Amended) A method of electric discharge surface treatment for forming a hard coat on a surface of a workpiece by which electric discharge is generated between an electrode for electric discharge surface treatment and the workpiece so that the hard coat is formed on the surface of the workpiece, comprising the steps of:

dividing an electric discharge current pulse into a first pulse width with a first peak value, a second pulse width with a second peak value, . . . , and an n-th pulse width with an n-th peak value (n is an integer equal to 2 and more);

setting the first pulse width and the first peak value so that an electric current density between the electrodes can be in a predetermined range to suppress emission of electrode material, and so that during a period of the first pulse width a diameter of an electric discharge arc column is extended; and

A2  
setting the k-th pulse width and the k-th peak value ( $2 \leq k \leq n$ , k is an integer) so that a quantity of supply of hard coat material by the emission of electrode material can be a predetermined value determined according to a predetermined processing condition.

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**Please add the following new claim 3:**

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A3  
3. A method of electric discharge surface treatment for forming a hard coat on a surface of a workpiece by which electric discharge is generated between an electrode for electric discharge surface treatment and the workpiece so that the hard coat is formed on the surface of the workpiece, comprising the steps of:

dividing an electric discharge current pulse into a first pulse width with a first peak value, a second pulse width with a second peak value, . . . , and an n-th pulse width with an n-th peak value (n is an integer equal to 2 and more);

setting the first pulse width and the first peak value so that an electric current density between the electrodes can be in a predetermined range to suppress emission of electrode material,

setting the k-th pulse width and the k-th peak value ( $2 \leq k \leq n$ , k is an integer) so that an amount of hard coat material supplied to a space between the electrode and the workpiece is increased to a predetermined appropriate quantity for formation of said hard coat.

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